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Abruptio Placentae 116 Cases: Role of PGE1 in Cervical Ripening and Induction of Labor, January 2006-August 2006

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Abstract

OBJECTIVES: In the very high risk obstetric cases of placental abruption, expediting delivery is of utmost urgency, since the complications are related to the abruption delivery interval. Before the introduction of prostaglandins for labor induction, it was a routine practice to do amniotomy and use oxytocin drip to accelerate labor when vaginal delivery was contemplated. We present 116 cases of placental abruption, including the severe cases, managed in the year 2006 during a period of 8 months, at Modern Government Maternity Hospital, which was the biggest maternity hospital in the combined state of Andhra Pradesh, and is the biggest in the state of Telangana, attached to Osmania Medical College. The role of prostaglandin E1 (PGE1), for cervical ripening and labor induction/augmentation has been analyzed in this observational study. A variety of variables including age, parity, gestational age, severity of abruption and maternal and fetal status, associated preeclampsia, Bishop score, availability of blood and blood products, associated complications, all factors influence the management adopted. **MATERIAL METHODS**: The response to PGE1 induction has been studied in terms of efficacy, the total number of doses of vaginal PGE1 in relation to parity, induction delivery interval, successful vaginal delivery rate, the indications for caesarean delivery, perinatal outcome and complications. A decision was made for either abdominal delivery or vaginal delivery on a case to case basis. A routine amniotomy was performed when the cervical os was open, both for confirmation of diagnosis and to release intra uterine pressure, and also it would help in the acceleration of labor. When the Bishop score was more than six, amniotomy was performed and an oxytocin intravenous drip was started. If the Bishop score was less than six, 25/50 mcg. Misoprostol (PGE1) was placed high in the vagina. **OBSERVATIONS**: Primies that had abruption were 27/116 = 23.27% and multies were 89/116 = 76.72%. In our study 68/116, (58.62%) had preec-

lamsia. In our series, gestational age at abruption was less than 36 weeks in 89/116, (76.72%) and >36 weeks in 27/116 (23.27%) at presentation. It is significant to note that 100/116 (86.2%) were unbooked and 16/116 (13.79%) were booked cases at our institute. Vaginal deliveries were 84 (74.2%) and caesarean deliveries were 30 (25.8%) in 116 placental abruptions. There were four maternal deaths 3.4%, two died undelivered. Perinatal mortality in our series was 92/116 (79.3%). **PGE1 induced labours—49:** When PGE1 was used for labor induction in 49 women, 40 (81.63%) had vaginal delivery and caesarean delivery was done in 9 (18.36%) cases for non progress of labor. Induction delivery interval was less than 12 hours in 45 (91.83%), more than 12 hours in 4 (8.1%). Preterm delivery in PGE1 induced cases was 40/49 = 81.63% versus preterm in 116 cases, 76.72%. This indicates that more numbers of preterm deliveries were allowed vaginal delivery. **DISCUSSION: Maternal mortality:** Better facilities of transfusion of blood products may have reduced maternal mortality in our series. Government maternity hospital is a public sector tertiary health facility providing free treatment. Early referral would make some difference. Acute defibrination leading to disseminated intravascular cougulation was the cause of three deaths, irreversible haemorrhagic shock in another. **CONCLUSION**: Induction of labor with PGE1 was useful and effective when cervix was unfavorable and Bishop score was less than six. With PGE1 induction (49) 91.83% delivered in less than 12 hours. There were no maternal deaths and PPH in 49 women induced with PGE1. Hence PGE1 was safe to use in these emergency high-risk obstetric patients. PGE1 usage to expedite delivery can reduce Caesarean section rate.

Keywords

Placental Abruption, Antepartum Haemorrhage, PGE1, Misoprostol, Labor Induction

1. Introduction

Placental abruption is defined as the premature separation of the implanted placenta, normally located, prior to the delivery of the fetus. The frequency of placental abruption has been reported as 3.75% and 4.7% [1] [2]. Earlier, Sarwar *et al.* [3], reported a prevalence of 4.4% in their population. Ananth CV *et al.* [4] hypothesized the criteria that were needed to define placental abruption as "severe" should be clinically meaningful and should include at least one of maternal, disseminated intravascular coagulation (DIC), hypovolemic shock, blood transfusion, hysterectomy, renal failure, or in-hospital death, or fetal, nonreassuring fetal status, intrauterine growth restriction, or fetal death, or neonatal death, preterm delivery, or small for gestational age, complications. The overall prevalence rate of abruption was 9.6 per 1000, of which two-thirds of cases were classified as being severe, 6.5 per 1000 [4]. The prevalence of abruption in European countries is 3 - 6 per 1000 pregnancies, whereas the corresponding data in North America is two-fold higher (7 - 12 per 1000 pregnancies). While the ab-

ruption rate has plateaued since 2000 in the US, all other European countries show declining rates [5].

Approximately 10% of all preterm births and up to one third of all perinatal deaths are caused by placental abruption (Ananth *et al.* 2006, Oyelese and Ananth, 2006) [6] [7]. Among women with placenta previa, the risk of abruption was 3 to 4 fold (Baumann *et al.* 2000) [8].

The long-term risk of death and morbidity from premature cardiovascular disease are approximately 2- to 6-fold higher among women with abruption compared with otherwise normal pregnancies [9]. The risk of premature cardiovascular disease is increased by 70% in these women (Ray *et al.* 2005) [10].

Veerbeek H.W. [11] demonstrated a strong association between placental abruption and the presence of cardiovascular disease risk factors after delivery. Cholesterol is an important risk factor for cardiovascular disease, and in women with a history of placental abruption, the cholesterol levels are significantly higher [11]. Biopsy studies obtained in women with placental abruption show a higher prevalence of abnormal spiral artery remodeling, decidual thrombosis, inflammation, and intimal and subintimal thickening (so-called acute atherosis lesions) than that observed in normal pregnancy. Maternal placental syndromes (MPS) that exhibit similar placental bed acute atherosis lesions may serve as markers for subsequent premature cardiovascular disease in that woman [11].

JOGC 2013 [12] has included in the indications for induction of labor as: High Priority: Preeclampsia ≥ 37 weeks, Significant maternal disease not responding to treatment, Significant but stable antepartum hemorrhage, Chorioamnionitis, Suspected fetal compromise, Term pre-labor rupture of membranes with maternal GBS colonization. Abruptio placenta has also been found to be associated with poor perinatal outcome, including low birth weight, increased incidence of prematurity and still birth.

The risk of severe abruption was substantially higher than mild abruption in relation to chronic hypertension (RR, 1.64 vs. 1.35), mild preeclampsia (RR, 2.06 vs. 1.69), and severe preeclampsia (RR, 4.21 vs. 2.00) [4]. Serious maternal complications occurred in 15.4 per 10,000 for nonabruption and in 33.3 and 141.7 per 10,000 in women for mild and severe abruption. The rate of serious complications for severe abruption remained fairly stable between 2006 and 2010, and increased sharply thereafter [4].

2. Objectives

In the very high risk obstetric cases of placental abruption, expediting delivery is of utmost urgency, since the complications are related to the abruption delivery interval. Before the introduction of prostaglandins for labor induction, it was a routine practice to do amniotomy and use oxytocin drip to accelerate labor when vaginal delivery was contemplated. We present 116 cases of placental abruption, including the severe cases, managed in the year 2006 during a period of 8 months at Modern Government maternity hospital, which was the biggest maternity hospital in the combined state of Andhra Pradesh, and is the biggest in

the state of Telangana, attached to Osmania Medical College. The role of prostaglandin E1 (PGE1), for cervical ripening and labor induction/augmentation has been analyzed in this observational study.

A variety of variables including age, parity, gestational age, severity of abruption and maternal and fetal status, associated preeclampsia, Bishop score, availability of blood and blood products, associated complications, all factors influence the management adopted.

3. Material Methods

The response to PGE1 induction has been studied in terms of efficacy, the total number of doses of vaginal PGE1 in relation to parity, induction delivery interval, successful vaginal delivery rate, the indications for caesarean delivery, perinatal outcome and complications. Complete physical and obstetric examination was performed. Fetal heart sounds were confirmed. Blood chemistry and coagulation tests were done. A decision was made for either abdominal delivery or vaginal delivery on a case to case basis. A routine amniotomy was performed when the cervical os was open, both for confirmation of diagnosis and to release intra uterine pressure, and also it would help in the acceleration of labor. When the Bishop score was more than six, amniotomy was performed and an oxytocin intravenous drip was started. If the Bishop score was less than six, 25/50 mcg misoprostol (PGE1) was placed high in the vagina after wetting the tablet but before it becomes powder. The woman is requested to stay in bed for half an hour. When fetus is alive, monitoring of fetal heart was done. Should any deterioration occur in the maternal condition or fetal status or the progress of labour be tardy caesarean delivery was planned.

4. Observations

4.1. Parity

Primies who had abruption were 27/116 = 23.27% and multies were 89/116 = 76.72%. In our study 68/116, (58.62%) had preeclamsia (Table 1).

4.2. Gestational Age at Abruption

In our series gestational age at abruption was less than 36 weeks in 89/116, (76.72%) and more than 36 weeks in 27/116 (23.27%) at presentation. Hence the number of preterm deliveries was 76.72% (Table 2).

4.3. Emergency Admissions

It is significant to note that 100/116 (86.2%) were unbooked and 16/116 (13.79%) were booked cases at our institute (Table 3).

4.4. Method of Labor Induction and Augmentation

When the Bishop score was more than 6, amniotomy was done and oxytocin infusion was started, in 44 (Table 4).

Table 1. Number of cases in relation to parity.

Parity	Primies	G 2	G 3	G 4
No	27	49	23	22
%	23.27	37.93	19.82	18.92

Note: Primies constituted 23.27%, Multies: 76.72%.

Table 2. Placental Abruption in relation to gestational age.

Gestational age in weeks	No.	%
<36 weeks	89	76.72
>37 weeks+	27	23.27

Note: Preterm delivery in 76.72%.

Table 3. Emergency admissions.

Booked vs. Unbooked	No	%
Booked cases	16	13.79
Unbooked cases	100	86.2

Table 4. Method of labor induction and augmentation.

Method in vaginal deliveries	No.	%
Bishop score > 6, Amniotomy + Oxytocin	44	37.9
Bishop score < 6, Amniotomy + PGE1	40	34.48
Caesarean deliveries	30	25.8

Note: Vaginal deliveries were 84.

When the Bishop score was less than 6, amniotomy was performed and vaginal misoprostol, PGE1 tablet was inserted, 25 or 50 mcg depending on the term of gestation in 49 cases of abruption. Out of 49, 40 had vagina delivery and 9 had caesarean delivery due to unsatisfactory progress of labor and other indications.

Vaginal deliveries were 84/116 (74.2%), 44, (37.9%) following oxytocin infusion and 40 (34.48%) after misoprostol induction. Caesarean deliveries were 30 (25.8%) in 116 placental abruptions. Two women died undelivered.

4.5. Indication for Caesarean Delivery in 30 Cases

At admission in 21 women a decision was made for abdominal delivery and 9 cases were taken up for C. section due to slow progress of labour following PGE1 induction.

The indications are shown in Table 5.

4.6. Mode of Delivery and Perinatal Outcome in 116 Cases

There were 72 cases (62.06%) with absent fetal heart sounds (IUD) at admission. Stillbirths were 10. (8.6%) and neonatal deaths were another 10 (8.6%). The average birthweight in neonatal deaths was 1.65 Kg. Perinatal mortality in our se-

ries was 92/116 (79.3%) (Table 6).

4.7. PGE1 Induced Labors—No. 49. Number of Doses Required for Delivery

20/49 = 40.81% cases delivered with a single dose of 25 mcg of vaginal misoprostol (Table 7).

4.8. No. of Cases in Relation to Weeks of Gestation

The gestational age at abruption was 28 weeks in 13 (26.53%) (Table 8), 28 to 32 wks in 11 (22.44%), 32 to 36 in 16 (32.65%) and 37 weeks+ in 9 (18.36%) in 49 PGE1 induced labours.

4.9. Induction Delivery Interval in 49 Cases

Induction delivery interval was less than 12 hours in 45/49 = 91.83% Table 9.

Table 5. Indication for Caesarean delivery in 30 cases.

Indication in group A	No. of cases
One previous LSCS	4
Two previous LSCS	2
Live foetus	9
Brow presentation	2
Abruptio + placenta previa	2
Abruptio + low lying placenta	2
Group B Failure to progress	9

Note: Group A: Immediate LSCS N = 21; Group B: Failure to progress with PGE1: 9.

Table 6. Mode of delivery and Perinatal outcome in 116 cases.

Perinatal outcome	TOTAL	VD	LSCS
IUD at admission	72 (62.06%)	63 (54%)	9 (7.75%)
Still births	10 (8.6%)	8 (6.8%)	2 (1.7%)
Neonatal deaths	10 (8.6%)	6 (5.17%)	4 (3.44%)
Live births	24 (20.68%)	11 (9.4%)	13 (11.2%)

Note: Perinatal mortality in our series was 92/116 (79.3%); the average birthweight in neonatal deaths was 1.65 Kg.

Table 7. PGE1 Induced labours, No. 49. Number of doses required for delivery.

Dose in mcg	No. doses	No. cases	%
25	1	20	40.81
25	2 - 5	9	18.36
50	1	11	22.44
50	2-4	9	18.36

4.10. PGE1 Induction n = 49, Birth Weight

Birth weight was less than 1.6 kgs in 27 cases, 55.1% shown in Table 10.

4.11. Perinatal Outcome with PGE1 Induction

Perinatal mortality in PGE1 induced cases was 81.63%. Out of these IUD at admission were 35/49 = 71.42%. Preterm delivery in PGE1 induced cases was 40/49 = 81.63% versus preterm in 116 cases of abruption, 76.72% Table 11.

4.12. Comparative Studies

The analyzed data in our study are compared with other Indian as well as international studies [13]-[20]. Year of study, Total number of cases of Abruption, Prevalence, associated preeclampsia/HDP, Preterm deliveries, vaginal deliveries,% of LSCS,PNMR, MMR, IUD at admission, multies% Table 12.

Table 8. Labor induction with PGE1 no.49.

Weeks of gestation	No.	%
28	13	26.53
28 - 32	11	22.44
32 - 36	16	32.65
37+	9	18.36

Note: No. of cases in relation to weeks of gestation; Preterm delivery in PGE1 induced cases 40/49 = 81.63%; versus preterm in 116 cases 76.72%.

Table 9. Induction delivery interval in 49.

Hours	No.	%
Less than 12 hours	45	91.83
More than 12 hours	4	8.1

Table 10. PGE1 Induction n = 49, Birth weight.

Birth weight in Kgs	No.	%
Less than 1.6	27	55.1
More than 1.6	22	44.89

Table 11. Perinatal outcome with PGE1 induction.

Perinatal outcome	No. of cases	%
IUD at admission	35	71.42
Neonatal deaths*	2	4.08
Live births	9	18.36
Stillbirths	3	6.12

*Neonatal deaths 1.2 kgs. In two cases; Perinatal mortality in PGE1 induced cases 81.63%.

Table 12. Comparative studies: Year of study, Total number of cases of Abruption, Prevalence, associated preeclampsia/HDP, Preterm deliveries, vaginal deliveries,% of LSCS,PNMR, MMR, IUD at admission, multies%.

Author	Year	Total no prevalence %	Preeclampsia/HDP %	Preterm %	LSCS %	Vag. delivery %	PNMR %	MMR %	IUD at admn. %	Multies %	Primies %
1) Downes *et al.* [13]	2002-2008	3619 1.6	PE & E-10.9 Gest. HTN-2.4 Chronic HTN-3.3	53.4						64.3	
2) Minna Tikkanen [14] Finland	1997-2001	198 0.42	PE-19-9.6% PIH-18-9.1% Chronic HTN-9-4.3%	59	91		9.2	-			
3) Mohd Saeed [15] Pakistan	2007-2009	100 1.1%	HDP-50	36	40	60	50	5	35		
4) Seema Bibi [2] Pakistan	2006	106 4.7%	Gest. HTN-8%	54	27	73	25.62/1000		Still births 51%	92	
5) Sarwar I [3] Pakistan	2003-2004	53 4.4%			30.2	69.8	67.9	Nil	58.5		
6) Nazli Hussain [1] Pakista	2008	81 3.75%	16	51	45	55	67	2.46	65		17
7 Pitaphrom [16] Thailand	1995-2004	103 0.92/1000		56.3			16.5				
8) Sheba Mathavi [17] IOG, Chennai	2012-2013	101 0.76	HTN-61.3		59	41	48	1.98 2/101	36.63	61.38	
9) Mrinalini Mitra [18]	2014-2015	58 0.98%	HDP-50	48.27	65.5		63.79	Nil			
10) Thieba [19]	2003	177			35.6	64.4	85.9	3.9	83.5		
11) Mukherjee S [20] Mumbai	2007-2009	318 4.4	HDP-25 (Gest. HTN-15.4, chronic HTN-1.9 PE-4.4,E-0.9)		30	70	68	3.5		81.14	18.86
12) Pratibha D Nagasree MGS Hyderabad	2006	116	58.62	76.72	25.86	72.41	79.31	3.4	62.06	76.72	23.28
PGE1 induced	2006	49/116		81.63	18.36	81.63	81.63	Nil	71.42		

4.13. Complications in Placental Abruption—116 Cases

Couvelaire uterus was noted in 5 cases, 4.3%, uterus retracted with application of hot mops in addition to medical measures and hysterectomy could be avoided **Table 13**.

4.14. Maternal Mortality in Abruptio Placenta

There were four maternal deaths 3.4%, two died undelivered. One case was admitted in a state of shock, expired in two hours while resuscitative measures were being instituted. Three women were being treated for disseminated intravascular coagulation, acute defibrination syndrome and coagulation failure. These three women could not be saved. One case with DIC was a case of intrapartum eclampsia, placental abruption was diagnosed after delivery when retroplacental clots were identified **Table 14**.

Table 13. Complications in Placental abruption 116 cases.

Complication	No.	%
Couvelaire uterus	5	4.3
Hysterectomy	Nil	
Eclampsia	1	0.8
Ascites	2	1.72
Maternal mortality	4	3.4

Table 14. Abruptio placenta, 116 Cases maternal mortality.

Gravida, gest. age	Condition at admission	Measures taken	Admission death interval
1) G2 P1 L1, 30 weeks	APH, BP-80 mm Hg. Systolic, IUD-1.1 Kg	4 units blood transfused. C. Section done. Relaparotomy, ligation of Tubo ovarian vessels	24 hrs. DIC with intraperitoneal bleeding
2) G4 P3 L3, Term	APH, BP-120/80 mm Hg.CT-11 min. Died undelivered	3 units blood, 3 units FFP transfused. ARM done	8 hrs. DIC
3) Primi, Term, Intrapartum eclampsia	3 seizures, BP-150/100 mmHg.CT-6 min	ARM done. Outlet forceps, IUD 2.6 kgs. Hematuria+	8 hrs. Detected retroplacental clots after placental expulsion
4) G5 P3 L3 A1, 30-32 wks. APH in shock	BP not recordable, Shock, Died undelivered	ARM done. 2 units blood transfused	2 hrs. Hypovolemic shock

5. Discussion

Parity wise distribution of cases is shown in Table 1. Primies who had abruption were 27/116 = 23.27% and multies were 89/116 = 76.72%. In our study 68/116, (58.62%) had preeclamsia. HDP, preeclampsia and gestational hypertension, were reported in 50% [8] and 61.2% [9]. In our series gestational age at abruption was less than 36 weeks in 89/116 (76.72%) and >36 weeks in 27/116 (23.27%) at presentation. It is significant to note that 100/116 (86.2%) were unbooked and 16/116 (13.79%) were booked cases. Vaginal deliveries were 84 (74.2%) and caesarean deliveries were 30 (25.8%) in 116 placental abruptions. There were four maternal deaths 3.4%, two died undelivered. Our caesarean rate is low compared to others.

The maternal mortality 3.4%, C. Section rate 25.8% compare with the data of another public sector health provider, 3.5% and 30% respectively, from Mumbai and Indore [20]. The number of unbooked cases at our institute 86.2% also is similar to 83.01% unbooked reported by Mukherjee S. [20].

Preeclampsia and hypertension of 58.62%, preterm deliveries 76.72%, intrauterine foetal death at admission 62.06%, unbooked admissions 86.2%, all these figures indicate that we are dealing with the high risk, very severe forms of AP.

When PGE1 was used for labor induction in 49 women, 40 (81.63%) had vaginal delivery and caesarean delivery was done in 9 (18.36%) cases for non progress of labor. Induction delivery interval was less than 12 hours in 45 (91.83%), more than 12 hours in 4 (8.1%). Preterm delivery in PGE1 induced cases was 40/49 = 81.63% versus preterm in 116 cases, 76.72%. This indicates

that more numbers of preterm deliveries were allowed vaginal delivery. Perinatal mortality in PGE1 induced labors was 81.63%, this is because of preterm delivery in 81.63% and IUD at admission in 71.42% and birth weight < 1.6 kgs in 55.1% in these cases. Opting for vaginal deliveries in cases of intrauterine foetal demise and in cases of abruption at early gestational age could be two reasons for greater perinatal mortality (PNM) in PGE1 induced labors compared to the overall PNMR. In placental abruption induction of labor with misoprostol was reported in 13.04% from Chennai [17]. Approximately 10% of women with placenta previa have coexisting abruption (Konje and Taylor, 2001) [21]. We had two cases (1.98%) of abruption with placenta previa and another two, abruption with low lying placenta (1.98%). Augmentation of uterine contractions by oxytocin infusion or ripening of cervix by prostaglandins must be done cautiously as the risk of uterine rupture may exist in placental abruption (Konje and Taylor, 2001) [21] associated with low lying placenta.

5.1. PNMR, the Health of the Neonate and the Surviving Infant

Placental abruption is associated with an elevated risk of need for neonatal delivery-room resuscitation, NICU admission, and longer NICU length of stay (LOS). Additionally, the finding of elevated risk of both respiratory distress syndrome and apnea among both preterm and term neonates suggests that abruption may be associated with physiologic under development, which has not been previously recognized [12]. Together, the results suggest that neonates in pregnancies complicated by abruption are vulnerable beyond the immediate perinatal time frame [12]. Abruption was also associated with elevated risk of apnea. Of particular note, the estimated risk of all neonatal outcomes remained elevated in the term group and the non-SGA group, which suggests that placental abruption had a direct negative effect on neonatal health [12]. The elevated risk of neonatal apnea may be responsible for the association between abruption and sudden infant death syndrome needs consideration [12].

Intrapartum asphyxia may lead to long term consequences among survivors. Neonates born after placental abruption are more likely to develop cystic periventricular leucomalasia or intraventricular hemorrhage (Spinillo *et al.* 1993, Gibbs and Weindling, 1994) [22] [23]. The risk increases with prematurity and low birth weight (Spinillo *et al.* 1993, Gibbs and Weindling, 1994) [22] [23]. Severe abruption increases the risk for cerebral palsy (Spinillo *et al.* 1993, Thorngren Jerneck and Herbst, 2006) [22] [24]. Placental abruption is also associated with sudden infant death syndrome (Klonoff Cohen *et al.* 2002, Getahun *et al.* 2004) [25] [26]. The rate of fetal malformations may be as high as 4.4% which is two times higher than that in general population. However, even term babies with normal birth weight have a 25 fold higher mortality with abruption (Ananth and Wilcox, 2001) [27]. Kayani [28] reported a study of severe placental abruption complicated by fetal bradycardia, a decision to delivery interval of 20 minutes or less was associated with substantially reduced neonatal morbidity

and mortality [28]. Changes thought typical of hypoxic-ischaemic insults rarely occur if the duration of profound hypoxia is less than 10 minutes, that has led to the introduction of 'crash' caesarean section and Code green.

All these complications in the neonates leave us in a dilemma, whether to feel happy or worried about the lower PNMR. Increasing caesarean rates to lower PNMR in the very low birth weight group, how justified are these, we need to ponder.

5.2. Maternal Mortality

Better facilities of transfusion of blood products may have reduced maternal mortality in our series. Government maternity hospital is a public sector tertiary health facility providing free treatment. Early referral would make some difference. Acute defibrination leading to disseminated intravascular cougulation was the cause of three deaths, irreversible haemorrhagic shock in another.

6. Conclusion

Induction of labor with PGE1 was useful and effective when cervix was unfavorable and Bishop score was less than six. With PGE1 induction (49) 91.83% delivered in less than 12 hours. There were no maternal deaths and PPH in 49 women induced with PGE1. Hence PGE1 was safe to use in these emergency high-risk obstetric patients. PGE1 usage to expedite delivery can reduce Caesarean section rate.

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